Ars Tactilis

Exploring the past through touch, reuse and technology of ceramics

Edited and curated by
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We would like to thank all the staff of the École Universitaire de Recherche Archaeological Challenges and AbilNova.

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INTRODUCTION

Beyond the gaze: history in your hands

by Elisa Perotti

The project "*Ars Tactilis*: Exploring history through touch, reuse and technology of **ceramic**" began as an idea within the academic context, then evolved into a reality that brings together **archaeology**, **education**, **accessibility** and **awareness**. The experience is divided into several moments, designed to combine knowledge, emotions and creativity.

Specifically, this project is the result of theories developed by a group of students from the École Universitaire de Recherche Archaeological Challenges, an advanced programme for students enrolled in courses focused on archaeology and cultural heritage from different European

universities. The training focuses on four themes: environment and climate change; power and inequality; conflict, mobility and migration; technology and innovation. Also referred to as “challenges” due to their central role in European archaeological research, these themes guide the development of the students’ projects.

Encouraged by this momentum, and with the support of Dr Irene Matassoni, the group came into contact with AbilNova, a social cooperative in Trentino that has been offering services for sensory disabilities, both visual and auditory, since 2008. The collaboration with this organisation has been fundamental in understanding the logistical aspects of this project, and their involvement continues throughout the event. In fact, the exhibition opens with an introduction that invites visitors, guided by AbilNova experts and the EUR ArChal team, to experience the perception of a space without the use of sight.

The research topic addresses the role and **reuse** of ceramics in the past, offering an immersive and unique experience that allows visitors to learn about archaeology in a different way. While in cultural institutions visitors are often discouraged from touching the artefacts on display, here they are invited to use their **sense of touch** to better understand the objects' characteristics.

Participants, divided into small groups, enter a completely dark space where they can explore the displayed objects by touch. The guides, blind staff members from AbilNova, accompany and assist visitors. In this context, darkness becomes an opportunity to put oneself in the shoes of those who live without sight, fostering empathy and new ways of understanding. The absence of light eliminates all perceptual differences, and everyone is thus on the same level, sharing a truly accessible experience. This experience allows visitors to

connect with the space and with archaeology in a new way.

The next phase takes place outside the darkness of the exhibition space and consists of a practical workshop. Participants have the opportunity to touch **clay**, the raw material, and learn about its characteristics, each making their own bowl. The activity allows them to reproduce gestures from the past and offers everyone a tangible reminder of what they have learned during the visit.

The event concludes with a moment of reflection, during which participants can share their experiences, particularly those related to the experience in the dark, and reflect on the impact of the activity on their perception of the world through senses other than sight.

The objects used as references for the **reproductions** on display were chosen to illustrate the role of ceramics in the past and the concept of

reuse. These include: a common **bowl**, used as a mould or tool for creating similar vassels; two **ostraka**, or fragments of inscribed pottery used for voting in Athens; a **cooking pot** with *chamotte* or gorg, as evidence of material **recycling**; an **oil lamp**, which allows us to explore the theme of typology as a classification method. The latter, along with the cooking pot and an *ostrakon*, were reproduced by **Arkéo Fabrik**, a French artisan company specialising in the experimental reproduction of archaeological materials. Lila Casamirra and Iris Imbert, curators of this volume and part of the EUR ArChal team, created two bowls and an *ostrakon*, gaining first-hand experience with clay and its handling techniques.

This catalogue will provide in-depth information on the individual objects on display, illustrating their archaeological context, the techniques used to create them and the processes involved in their reuse. It will conclude with a consideration on the principles behind the project, such as accessibility

and **sensory** **fruition** of archaeology. To ensure accessibility to this information, an online version will also be available for consultation using screen readers.

1. Bowl

By Lila Casamirra

The first object reproduced and displayed acts as an introduction into the world of ceramics from an archaeological perspective. Indeed, the simplicity of the bowl allows us to consider the essential aspects of a ceramic artefact: the raw material, the manufacturing techniques, and the life of the artefact, which embodies the central theme of the exhibition.

Composition

'Ceramics' is a term used to describe the different stages and processes applied to the same raw material: clay. Being readily available in nature and particularly easy to manipulate, clay has a very long

history of use by humans, making it extremely important in archaeology.

Microscopic analysis reveals that clay is composed of a set of minerals with a lamellar structure[1], which is why it is often referred to using the plural. The main characteristic of clays is **plasticity**, that is the ability of the material to be molded without breaking and to retain the given shape once the applied stress is released[2], a property that depends on the amount of **water** present in the compound and explains why clay soils are found mainly in humid environments. In **pedology**, the discipline that studies soil formation, the sources of clay are classified as sedimentary deposits of various types, specifically: fluvial, alluvial, lacustrine, aeolian, and, when rich in organic matter, as anthropogenic or urban deposits. The anthropologist Prudence M. Rice devoted herself to the creation of a guide for

[1] «Clays are aluminum silicates with varying degrees of hydration, microcrystalline in nature, and characterized by an internal lamellar, or "**sheet-like**" structure» (Cremaschi 2000, 28; translated from Italian)
[2] Bergaya and Lagaly 2006, 5

the study of ceramics in the archaeological field. In this guide, clay is defined as a sediment formed by the disintegration and decomposition of silicate rocks through physical, chemical, and biochemical weathering processes[3].

This reasoning leads to understanding clays as a type of earth and naturally raises the question of how objects made as long as 20,000 years ago have survived until today[4]. The answer lies in **fire**. Indeed, another property of clay is its ability to harden when exposed to a heat source, losing its plasticity. From this process derives the term ***terracotta***[5].

Processing

Between the preparation of the raw material and the final treatments, **modeling** represents the

[3] A process also known as weathering and described in chapter 2.1.2 (Rice 2015)
[4] Rice 2015, 1.2.1.1
[5] The behaviour of ceramics when exposed to fire will be explored in more detail in the reflections on the next object.

intermediate phase in the creation of ceramic shapes[6]. This phase is explored in the workshop component of this dissemination project and therefore deserves particular attention.

Modeling techniques have been widely studied and classified most notably by **Valentine Roux**[7], who identified several key variables: the source of energy, the volume and number of initial segments, the hydration of the mixture and **the characteristics of the force** applied to the raw material. The latter can be described through actions of pressure or percussion, which may be applied continuously or discontinuously, for which both direction and intensity can also be defined.

The considerations regarding the forces at play during clay processing encourage a distinction between the employment of the **potter's wheel** or its absence. The introduction of this technology marks a ***terminus post quem***, making the

[6] *Processing of clay, forming and firing* (Thèr 2020)
[7] Roux 2019

identification of its use extremely valuable in archaeological investigation. Before its spread, **modeling** was carried out **freehand** or using the **coiling technique**, obtained by rolling long strips of clay upon themselves.

By interacting with the objects displayed in this exhibition, visitors can recognize all the techniques employed in their creation. As archaeological research often begins with the finished object, it is essential to remember that the characteristic of the raw material also have an impact on the final result, not only the modeling. This aspect is examined through petrographic analysis, which will be discussed in more detail on page 31.

The object

After describing some of the fundamental stages involved in producing a terracotta bowl, it is now necessary to introduce the concept of the ***chaîne***

opératoire[8]. This term summarises the sequence of actions that determine the creation and life of an object, beginning with its design by human intention. However, the *chaîne* can only be considered complete when proper attention is given to the notion of reuse[9].

The bowl is an omnipresent object in archaeological contexts[10]: it may be miniaturistic, simple or decorated, and it may feature handles, which can bear distinctive elevations. It can be used to draw from a larger container or to hold and consume various contents. Here, the term *"bowl"* is used in a broad sense, including cups and goblets, even though they possess different formal parameters. The exhibited bowl is inspired by an artifact housed in the Archaeological Museum of

[8] Leroi-Gourhan 1964
[9] Brysbaert 2011
[10] Examples include Copper Age bowls in Italy, found in numerous regional cultures (Pacciarelli, Scarano and Crispino 2015), and the widespread use of the Corinthian cup, known as *skyphos* (Kourou 1994)

Bari (Italy), dating to the Eneolithic–Bronze Age[11] [12]. The models on display were made by the author in order to gain familiarity with the material and to prepare for the workshop component of the project.

When an object loses its original shape, its relationship with the user changes, and consequently, so does its function. This process, which may be described as **defunctionalisation**, can occur intentionally or accidentally. If intentional, it is often interpreted as ritual, especially when found in funerary contexts[13]. Alternatively, it may have been **repurposed** in various ways: as a mould to produce a smaller bowl with higher walls, as a tool for shaping other ceramics, or as construction material[14]. The example on display was chosen precisely to

[11] Ciotola Bari, *Catalogo Generale dei Beni Culturali*
[12] The period known as the Eneolithic or Copper Age lasted from 2800 to 2100 BCE in southern Italy, followed by the Bronze Age (Pacciarelli, Scarano and Crispino 2015)
[13] Bruni 2019
[14] Handberg 2011, Martin 2008, Vuković 2015

encourage reflection on these dynamics of transformation.

In other cases, large accumulations of ceramic waste can have a significant impact on the landscape. In Rome, for instance, Monte Testaccio is entirely the result of a massive accumulation of ceramic fragments, primarily Roman amphorae arriving from a nearby port on the Tiber River[15]. In this instance, the accumulation did not have disastrous effects on the surrounding area thanks to the draining properties of ceramics. The same property made them useful in agriculture, both for improving drainage and as a fertiliser[16]. This example highlights how **the impact of waste** can vary greatly, even when it involves accumulations of monumental scale.

[15] Cremaschi 2000, 184
[16] Cremaschi 2000, 99

2. Ostraka

By Ambra Famiglietti

The word ***òstrakon***, from the Ancient Greek **ὄστρακον** (*pl.* **ὄστρακα**, *òstraka*), originally meant "shell". Over time, this term came to denote fragments of pottery from broken vessels. In the ancient world, such sherds - common and easily available - were often **reused as writing supports**. On them, people could inscribe or write texts in ink, thus giving new purpose to a discarded material.

Ostraka served a variety of practical functions: accounting notes, payment receipts, inventories, school exercises, or short everyday messages. Beyond these ordinary uses, in Athens, at the height of the Classical period[17], these fragments

[17] From the perspective of Athenian culture in classical Greece, this period is generally referred to as spanning from the 5th to the 4th century BC (Giuliano, 2004)

acquired a distinctly political significance, linked to the process of **ostracism**, an institutional practice characteristic of Athenian democracy in the 5th century BCE.

Ostracism in the Athenian Political Practice

Ostracism was an institutional mechanism that provided for the temporary exile, lasting ten years, of a citizen considered potentially dangerous to the stability of the city. It was not a punishment for a crime, but rather a preventive measure against the excessive concentration of power in the hands of a single individual or group of individuals[18].

Each year, the popular assembly, the ***Ekklesía***, decided whether to hold an ostracism vote. Only adult free male citizens, those fully entitled to

[18] Thucydides attributed the establishment of this practice to fear and insecurity, *The History*, VIII, 73. Plutarch, on the other hand, argued that it arose from the natural envy and jealousy found in a democracy, *Themistocles*, 22; *Aristides*, 7

participate in political life, could write on a pottery fragment the name of the person they wished to exile. A ***quorum*** of 6,000 votes was required. The citizen who received the highest number of votes had to leave Athens within ten days but retained his property and civic rights, being able to return after the established period.

This practice, attested from the early 5th century until 417 BCE, involved prominent figures such as the ***strategos*** Themistocles (ca. 528 - ca. 461 BCE), the politician Aristides "the Just" (ca. 530 - ca. 468 BCE), and the commander Cimon (ca. 510 - ca. 450 BCE). Alongside these renowned names, archaeological evidence shows that lesser-known citizens also fell victim to the procedure, underscoring the collective and sometimes unpredictable nature of ostracism. Some fragments even bear insults, nicknames, or words such as *limos* ("famine"), signs of a vote motivated more by emotion than by politics.

Ancient sources, including Aristotle, Philochorus, Plutarch, Pollux, and Diodorus, offer divergent accounts regarding the origins and details of the practice, while archaeological finds provide the most reliable documentation. Even the inventor of ostracism remains a topic of debate among modern scholars[19], though somewhat surprisingly: several ancient authors clearly identify Cleisthenes[20] (565 - 493 BCE), one of the founders of Athenian democracy, as its promoter.

Epigraphic and Linguistic Aspects

Over 11,000 ostraka have been found in Athens, many originating from large dumps. The analysis of these artefacts allows researchers to reconstruct political dynamics, factional relationships, and voting practices.

[19] Beloch, 1893, 332; Hignett, 1953, 159 ss.
[20] Aristotele, *Ath. Pol.*, 22, 1-4; Claudio Eliano, *Hist. Var.* XIII, 24; Filocoro in Jacoby, 1923, fr. 30, p. 108; Eforo in Diodoro XI, 55

The inscriptions typically follow a standard formula: the name of the candidate, the **patronymic** (the father's name), and the **demotic** (the name of the deme or territorial-administrative district in which Athenian citizens were registered). For instance, writing *Themistokles Neokleous Phrearrios* meant "*Themistocles, son of Neocles, of the deme of Phrearrios*". This ensured that a citizen's identity was unmistakable, preventing confusion between people with the same name: as if today, in addition to the first name and surname, one also added the father's name and the neighbourhood of origin.

The inscriptions display varying levels of literacy: spelling errors, overwriting, and added letters reveal the spontaneity of the gesture. From a **paleographic** perspective, *ostraka* therefore represent a valuable source for studying the evolution of the Greek alphabet. The informal nature of the support and the unequal skill of the writers do not always allow precise interpretation of letter forms, yet this very diversity makes the

material even more significant as a reflection of everyday writing practices.

The Ostraka Replicas on Display

The reproductions of *ostraka* presented in this exhibition allow visitors to "encounter" the main figures of Athenian political life up close. They illustrate the transformation of a domestic, everyday object into a means of civic participation. To inscribe a name on a ceramic fragment meant taking part in a collective decision, one that could determine the fate of a fellow citizen.

The first fragment (**P 17671, E 1 (A 18-19:1)**[21]) bears an inscription carved along the upper inner rim - now incomplete due to the breakage of the shard (on the right) - reading *Hippokrates Alkmeonidou Alopekethen* (*ιπποκρ[άτες] Ἀλκμεο[νίδο]*), "Hippocrates, son of Alcmeon, of the deme of

[21] Agora inventory number and identification number of the place of discovery

Alopeke". Made from the rim of a small, black-glazed amphora, this *ostrakon*, about 7.5 cm in size, was found in a large deposit in the valley between the Areopagus and the *Kolonos Agoraios*, and probably dates to 482 BCE. The inscription refers to a member of the powerful Alcmaeonid family, key players in early Athenian politics.

Although his figure remains only partially documented, the frequent recurrence of his name among ostracism candidates reminds us that Athenian political tensions involved not only famous leaders such as Themistocles or Aristides, but also other members of the city's elite, whose fates could hinge on a single name etched into a pottery shard.

The **second fragment** (**P 5946, D 10**[22]) bears the name *Kallias Didymiou*, "Callias, son of Didymios". (*Καλλία[ς] Διδυμ[ίο]*)[23]. It consists of a circular clay disk

[22] Agora inventory number and identification number of the place of discovery

[23] To learn more about Callia: Piccirilli, 1996

fragment, measuring about 6.4 cm at its widest point, on which the name was written in black paint rather than incised. This quicker, more uniform technique suggests a context of serial production, perhaps linked to an organized political campaign.
Callias is a better-known figure: he was a celebrated athlete, victor in several competitions, including the Panathenaic Games of 486 BCE and the Olympic Games of 472 BCE. His athletic success, commemorated with statues on the Acropolis and inscribed dedications[24], increased his public visibility and made him an influential, though controversial, figure. Aligned with the "conservative" opposition led by the historian Thucydides against Pericles, he soon became a target of political hostility.

[24] The inscribed bases relating to these two statues are still preserved: the first was erected in bronze around 470 BC (I. Olympia 146; IG I³ 1473, Mus. Olymp. 119; Paus. 6.6.1) and the second erected shortly after 472 BC (Raubitschek, 1949, nr. 164; Moretti, nt.1, nr. 15; IG³ 893 Acrop. inv. 13255) or maybe in 430 BCE.

Ancient sources, including Pseudo-Andocides[25], together with the paleographic evidence of the *ostraka*, indicate that Callias was indeed exiled around 443/2 BCE. Pericles is thought to have orchestrated an ostracism campaign against him[26], aiming to remove one of the leading representatives of the opposition.

Thus, this fragment not only preserves the name of an athlete-turned-politician but also reflects the fragility of public careers in Classical Athens, where popularity could swiftly turn into grounds for exclusion.

Diffusion and Legacy

The Athenian model influenced other Greek cities and even spread beyond Greece: similar artifacts

[25] 4. 32. The information provided by Pseudo-Andocides is considered reliable by: Moretti, nt. 1, nr. 35; Moretti, (nt 1) 91; Vandetpool, (nt 22) 240; Rhodes, 1993, 271, 350

[26] Vandetpool, (nt 22) 240; Lang, (nt 23) 65

have been found in distant regions, attesting to the widespread impact of this practice.

By the end of the fifth century BCE, ostracism fell out of use, replaced by faster judicial procedures. The term, however, survived into modern language, taking on the meaning of “exclusion” or “social marginalization.”

The archaeological *ostraka*, with their hastily inscribed or painted names, remain tangible fragments of Athenian political participation, demonstrating how, in antiquity, even a simple piece of broken pottery could become a tool of democracy.

3. Cooking vessel

By Chiara Mengascini

The third item on display is a reproduction of a cooking vessel dating back to the Roman Imperial period (1st-3rd century AD) and found in a burial site in Veneto[27]. It is a low, wide pot, made on a potter's wheel and used for cooking food.[28].

The *chamotte*

The distinctive feature of our vessel is its composition: it is not made solely of clay, but contains various **inclusions**, meaning small solid fragments of different materials, such as limestone, quartz, and coarse-grained ***chamotte***[29].

[27] Albettone (VI), Location Lovolo - A31 (Valdastico South). Lot 5. Section 444-445
[28] Tegame Padova, *Catalogo Generali dei Beni Culturali*
[29] *ibid.*

“*Chamotte*” is a French word that refers to the material obtained from finely ground terracotta derived from ceramic waste. It is a degreasing agent, that is a component that reduces or **balances the plasticity** of clay by adding solid fragments, helping to improve the structure of the ceramic. It is prepared by the potter, who intentionally adds it to the clay mixture. It is coloured, usually in reddish or pinkish shades, with varying degrees of darkness.

Adding materials such as *chamotte* and quartz to the clay mixture provides a more robust structure to the piece and thus reduces the risk of breakage and cracking. This is because the presence of these foreign bodies regulates the possible expansion and contraction of the piece’s volume during firing. In the potter’s workshop, *chamotte* does not represent an additional cost as it is easily available, although it must first be crushed and ground.

Chamotte is mainly found in **coarse ware**, that is, in vessels with thick and rough walls, suitable for everyday use.

In fact, in **fine ware**, which consists in smooth and polished items, the likelihood of *chamotte* being present is very low, as its inclusions would require careful and prolonged grinding[30]. For further information on this type, please refer to p.36.

The cooking vessel under analysis was mainly used for cooking dry foods, possibly with oil, through frying and toasting. It was probably also used to bake flatbreads in ovens[31]. In addition to the **typological** and functional examination of ceramics, archaeologists also use **archaeobotany**, the discipline concerned by ancient plant remains. Analysis of these remains can reveal aspects of the diet and culinary practices of ancient people[32].

[30] Cuomo di Caprio 1985, 89-90
[31] Quercia 2008
[32] *Archaebotany: How People used plants in the Past, History England*

The study of inclusions: petrography

Petrography is the science that describes and classifies rocks based on the minerals they contain, studying their origin and the processes of transformation over time. Petrographic analysis is the main method used by archaeology to identify minerals in ancient ceramics. Minerals are identified through the examination of **thin sections** under a microscope.

The sample preparation phase is fundamental: thin sections are obtained by taking parts of appropriately treated samples, which are mounted on a slide and then polished. From this point onwards, the characteristics of the minerals in the sample, such as their size, shape and recurrence, can be observed closely[33].

In addition to revealing the composition of the clay mixture and helping us understand the stages of its processing, petrographic analysis can also provide

[33] Rice 2015

information about the **provenance** of the materials observed. All the minerals identified in ceramics from the same archaeological site are compared with the local **geological deposits** of the period. If there are similarities, it can be deduced that the materials used come from local sources. If, on the other hand, they are not compatible, they are foreign to the context in which they were found, thus potentially providing information about trade or migration routes[34].

Indeed, since each ceramic production area used the materials at hand, these small inclusions serve as a sort of identity card for the cooking vessel, revealing where it comes from and who made it.

Recycling

The cooking vessel is an excellent example to explain the concept of recycling in ancient ceramic production: fragments of already fired ceramics are

[34] Courty and Roux 2022

reduced to granules (known as *chamotte*) and reused to produce new ceramic artefacts together with other minerals' **inclusions**[35]. These materials, which would otherwise be wasted in the craftsman's workshop, give the mixture greater resistance to temperature changes and daily wear[36]. With these qualities, the vessel had a much longer life. Kitchenware was of everyday use and therefore helps us to reconstruct domestic activities of the past, allowing us to understand what people ate and how and where they cooked[37]. An everyday object thus combines recycling with functionality, demonstrating how perfectly the two aspects were intertwined in Roman craftsmanship.

[35] Vuković 2015
[36] Evans 1993
[37] Smyrnaios 2022

4. Lamp

By Iris Imbert

A lamp is an object that produces light. It can be made of different materials, including stone, metal or terracotta, and works through an energy source and a fuel, such as vegetable or animal fat or beeswax.

This type of object has ancient origins and is documented since the Palaeolithic era, enduring through all subsequent periods with its function remaining essentially unchanged. Its long-lasting use makes its presence in the exhibition essential.

The reproduction on display is that of a Roman oil lamp dating to the 2nd-3rd century AD and preserved in the archaeological section of the Provincial Museum of Torcello, in Veneto. It is circular in shape and presents an elongated **spout** and a decoration on the upper surface depicting a theatrical mask.

The inscription "**C. Dessi**" appears on the bottom, probably referring to the workshop where it was produced.

Production techniques

This type of clay lamp was made using a **mould**, generally consisting of two halves. The clay, which had been moistened beforehand, was spread in a thin layer and pressed against the walls of the mould to take on its shape. The two parts thus obtained were then removed from the mould and joined together with the aid of liquid clay, forming the body of the lamp. This was followed by the **finishing stage**, during which the spout for the **wick**, any **handles** and decorative elements were added. The potter then proceeded to **smooth** and **polish** the surface, operations that not only served to even it out but also to seal the pores of the clay, making it more compact and impermeable[38]. All

[38] Roux 2019

these stages, including engravings and inscriptions, were carried out before firing, while the clay was still malleable.

Typology and datation

The lamp on display was identified as belonging to this typology, based on the Veneto Region's asset record: **open channel**, **Loeschcke**, **tipo Xa**[39]. This object was chosen because it allows us to address several aspects of ceramic studies in archaeology, such as typological classification and the methods used to determine an object's function. Specifically, typological analysis allows the archaeologist to **classify** and therefore **date** the object, based on their shape and morphological variations.

In the case of ceramics, **typology** allows **types** and **subtypes** to be distinguished (for instance, jugs with a mushroom or trefoil mouth) and associated

[39] Regione del Veneto, "Scheda Bene CRV-RA_0011247 – Open channel lamp, Loeschcke tipo Xa"

with specific archaeological cultures. Roman pottery, for example, has different characteristics from Gallic and Greek pottery of the same period. The organization of types according to chronological criteria gives rise to a **chronotypology**, a useful tool for **relative dating**[40] of excavation contexts[41]. Indeed, we refer to fragments that can be traced to a typology as diagnostic, meaning they can be compared with known data. Their identification allows us to determine a chronological limit for the layer under investigation, since certain productions did not exist before a specific period[42].

[40] In contrast to absolute dating: a year, a day, a month, obtained, for example, through radiocarbon dating
[41] The first types and chronotypes were created by the Count of Caylus in the 18th century in his work *Recueil d'antiquités égyptiennes, étrusques, grecques, romaines et gauloises*, cf. Djindjian 2011
[42] Gardin 1979

How can you identify the function or uses of an object?

The function of an object corresponds to the use intended by the craftsman at the time of manufacture, while the actual uses may differ from the original intent. To identify them, a **morphometric analysis** is first carried out, assessing shape, size, capacity and surface treatment[43].

These observations give rise to functional hypotheses that allow objects to be classified into categories: storage containers are generally large, those with an **open shape**, with a circumference wider than the base, are associated with preparation or presentation, while those with a **closed shape** are useful for containing liquids. Deep containers were likely used for boiled or stewed dishes, while shallow ones for grilled or fried dishes[44].

[43] Tsirtsoni 2001
[44] Sophronidou and Tsirtsoni 2007, 260

Hypotheses formulated based on observation and the context in which the finds were made (dwelling, sanctuary, burial site, etc.) can then be confirmed or refuted by analysing the residues. One type of analysis that focuses on botanical remains is archaeobotany, already mentioned on p.30.

The functioning of the Roman oil lamp

The oil lamp consists of a circular reservoir, known as **discus**, and a **spout** that holds the wick. The fuel, typically oil, was poured into the reservoir and absorbed by a textile fibre wick, the end of which protruded from the spout. In this way, the oil lamp could be lit and used much like a candle.

The burning of the fuel and wick often left **black marks** on the edge of the spout[45], which help

[45] Skibo 1992

identify its actual use, distinguishing its context from, for example, a production area.

Chemical analysis of organic residues, on the other hand, allows the type of fuel used to be identified. This process involves taking tiny samples from the inner surface of a ceramic vessel, which are then analysed using specific techniques, such as **gas chromatography** and **mass spectrometry**, allowing the detection of vegetable or animal fats or beeswax, in the case of oil lamps[46].

Traceology

Another method of analysis is **traceology**, a type of ***use-wear analysis*** which involves studying the micro-traces formed as a result of its use on the

[46] Rueff 2020

vessel. There are three types: abrasions, scratches and chips[47].

These **marks** indicate how the object was used. For example, the presence of an abraded area beneath the surface of the object indicates that it was regularly moved across hard surfaces. Wear on the handles of an object may indicate that it was hung up[48]. Finally, wear on the edge may indicate that the object was stored upside down.

In the case of the oil lamp, the traces that can be expected are: wear on the base, indicating that the object was placed down and moved, and wear on the handle (not present in the current model) could indicate how the object was held.

In conclusion, the combination of these observations allows us to reconstruct the **life cycle of the object** with great precision, from its everyday use to its symbolic function as a bearer of light.

[47] Vieugué 2013
[48] Vieugué 2013

Although its craftsmanship may appear more elaborate, it is made from the same base material as the other objects on display and thus shares their potential for reuse.

Representing Technology

By Antoine Leviel

How did we obtain the reproductions?

As stated in the introduction, the collection for this exhibition was assembled through several complementary approaches. Alongside the reproductions commissioned from Arkéofabrik, a company specialising in archaeological replicas, additional pieces were created directly by members of our team, integrating experimental practice with research and education.

Finally, from an exploratory perspective and to engage with new technologies, we also made use of 3D printing. At the Image and Digital Technology Centre of Paris 1 Panthéon-Sorbonne University, a 3D model of the exhibition logo was designed and

printed to make a visual element accessible to blind and visually impaired visitors. This initiative illustrates the complementarity between digital innovation and archaeological outreach.

These diverse methods reflect our commitment to combining scientific rigour, accessibility, and a pedagogical approach, allowing a wide audience to engage with the technological and cultural dimensions of ancient ceramics.

In the organisation of this exhibition, we benefited from the financial and scientific support of the Archaeological Challenges University Research School, the financial support of the Caritro Foundation, and the technical collaboration of the AbilNova association.

3D printing of the logo

The 3D-modelled and printed object depicting the exhibition's logo was made in the interest of accessibility. Indeed, the goal was to render a purely visual element tangible, ensuring that every component of the exhibition could be experienced by all visitors. The project was developed in partnership with AbilNova, an association supporting people with sensory and hearing disabilities.

The logo, designed by Emma Pascucci, depicts a ceramic sherd—specifically the neck of an amphora—surrounded by three hands forming a Möbius strip, symbolising the endless cycle of reuse and recycling, a key theme of the exhibition.

Once the logo was designed, its outlines were reproduced in Inkscape and exported as an SVG file, then imported into Blender for 3D modelling. After refining the model and adjusting the geometry, the

file was printed by Cyrille Galinand, head of the Image and Digital Technology Department at Paris 1 Panthéon-Sorbonne University, using a Raise3D E2 printer and PLA filament.

CONCLUSION

From the very first meetings dedicated to the definition of the project, there was a clear intention to create a potentially replicable model of event, capable of preserving, in its future iterations, the core principles and objectives that already define it. These principles, inspired by the education received through the ArChaI project, concern the importance of accessibility, research, and dissemination, while the objectives are directly linked to the central theme of the research: sustainability, understood in its environmental, cultural and social dimensions.

The idea that knowledge of the materials and technologies required to produce everyday objects represents the first step toward developing a critical awareness of waste is another belief behind the realisation of this project. Indeed, to comprehend how things are made and how they can be reused means recognizing in ancient

artifacts an inheritance of sustainable mastery, capable of inspiring more mindful behaviors in the present.

In this sense, education can arise from curiosity about the past and from hands-on experiences offered by projects such as this one, which open up numerous opportunities to engage with the unknown.

In this case, that unknown finds its expression in the decision to hold the exhibition in the dark. This experience invites reflection on disability and on the ways of relating to blind and visually impaired people, while also drawing attention to the perceptions activated by the other senses in the study of objects from the past.

This is why any future applications of this model can be considered fully successful only if they preserve the principles of accessibility and collaboration with people with disabilities.

As a result of the opportunity it arose from, *Ars Tactilis* fits seamlessly within the contemporary

landscape of the cultural sector, combining research, dissemination, and education.
The work presented here aligns with the most recent museum and educational initiatives aimed at making culture genuinely participatory[49], thus representing an important intermediate step in the educational and professional development of the participants.
Each planning decision is to be understood as the result of a collective and shared process, reflecting the experiences and aspirations of young professionals eager to promote cooperation and to experiment with science as a tool for knowledge and dialogue.

[49] Take, for example, the new entrance halls of the Egyptian Museum in Turin, which integrate interdisciplinary approaches and new forms of cultural mediation.

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GLOSSARY

Key words

Clay: a natural, earthy, plastic, and moldable material which, once fired, becomes hard and durable, resulting in ceramics.

Ceramics: a conventional term used in archaeology to refer to all objects made of fired clay. Employed since antiquity for the production of both utilitarian and artistic items.

Recycling: the process of transforming waste materials into new resources or products.

Reuse / Reemployment: the renewed use of an existing object or material, often for a function different from its original one.

Reproduction: a replica of an ancient object, created using techniques and materials similar to the originals, for educational and research purposes.

Terracotta: a specific term referring to clay that has been shaped and fired at a low temperature.

Technical Vocabulary

Accessibility: a principle of inclusive design that ensures equal access, understanding, and participation for all visitors, regardless of physical or sensory ability.

Handle: an element of a ceramic form that serves as a grip or hold. It may be shaped as a strap, rod, or cord and applied to the vessel body while the clay is still plastic. Beyond its practical use, it may also have decorative or symbolic value.

Archaeobotany: an analytical technique that studies plant remains found in archaeological contexts; it can form part of various methods for residue analysis.

Spout: the projecting part of a lamp or vessel designed for the outflow of a liquid or for the placement of a wick. In Roman lamps, the spout is often elongated and may show traces of combustion from use.

Burnishing: a surface-finishing technique in which the ceramic surface is polished with a smooth tool (such as a pebble or bone) while still slightly damp. This process closes the pores of the clay, making the vessel denser and giving it a glossy surface.

Chaîne opératoire: French term denoting the sequence of technical and gestural operations leading to the creation, use, and eventual disposal of an artifact.

Chamotte / Grog: technical terms for crushed ceramic fragments reused as a temper in clay mixtures to improve thermal and mechanical resistance.

Coiling: a hand-building technique in which clay is shaped into coils or ropes that are stacked to form vessels or other shapes.

Gas Chromatography and Mass Spectrometry: chemical analysis techniques used to identify organic residues such as fats, proteins, waxes, resins, and other compounds. Useful for

reconstructing the contents or original uses of archaeological materials.

Chronotypology: a method for classifying artifacts based on form and chronological evolution, allowing typologies to be organized into sequences that aid in dating archaeological contexts.

Defunctionalisation: the process by which an object loses or changes its original function, acquiring a new one or becoming an archaeological artifact.

Deme: a territorial and administrative unit of Attica, representing the local community to which each Athenian citizen belonged.

Demotico: the indication of affiliation with a deme, often added after the personal name and patronymic.

Ekklesía: from Ancient Greek, the assembly of Athenian citizens with voting rights, the principal body of Classical democracy.

Fruition: in the museum context, the experience of visiting or “engaging with” cultural heritage.

Inclusions: solid elements within the clay mixture, such as sand, quartz fragments, or *grog*, which modify its texture, strength, and color after firing.

Smoothing: a refining operation performed after partial drying of the clay, consisting of evening the surface to eliminate irregularities and modeling marks. Often preceding or accompanying burnishing, it improves both the appearance and functionality of the artifact.

Modeling: the stage in ceramic production during which, after preparing the raw material, the clay is shaped - by hand or on the wheel - into the desired form.

Morphometry: the study of forms and the relationships between their dimensions, aiding in the determination of typology and function.

Ostracism: an Athenian political procedure providing for the temporary exile of a citizen, decided by public vote cast on pottery fragments (*ostraka*).

Ostrakon / Ostraka: from Ancient Greek, a term indicating a pottery fragment used as a writing or voting support, especially in Athenian ostracism procedures.

Paleography: the study of the form and development of ancient scripts, useful for dating and interpreting documents and inscriptions.

Patronymic: the father's name, used as an identifying element of a citizen in Greek inscriptions.

Pedology: the science that studies the formation, composition, and structure of soils.

Petrography: a branch of geology analyzing the mineral composition and structure of rocks; in archaeology, it is applied to ceramics to identify their origin and production techniques. It can be conducted with the aid of a microscope through the observation of thin sections.

Plasticity: the property of clay that allows it to be molded without breaking while retaining the shape given to it.

Quorum: the minimum number of participants or votes required for the validity of an assembly or electoral decision. In the Athenian context, at least six thousand voters were needed for ostracism to be valid.

Finishing: the final stage of ceramic production.

Mold: also called a matrix; a form used to produce multiple copies of the same object.

Wick: a cord made of vegetable or animal fiber that, when immersed in a fuel such as oil or wax, allows combustion and produces light. In ancient lamps, the wick was inserted into the spout, where its lit end emitted the flame.

Strategos: an Athenian magistrate with both military and political functions; a highly prestigious figure in the polis.

Typology: a classification method used in all sciences to facilitate the identification of similarities and differences.

Terminus post quem: Latin expression indicating the earliest possible date for an event or the deposition of an artifact.

Potter's wheel: a disc-shaped machine rotated on a vertical axis, on which the potter shapes clay into a symmetrical form.

Traceology: the study of microscopic wear traces on artifacts, useful for identifying their specific functions or modes of use.

How do you imagine

the objects from the exhibition?

Try drawing them …